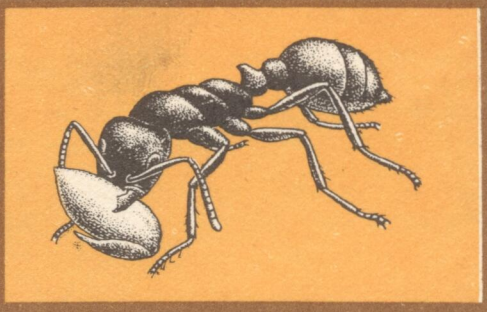
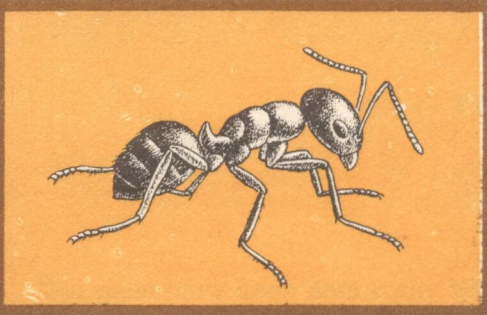


ANT TOWN

a laboratory for the cultivation and study of ants



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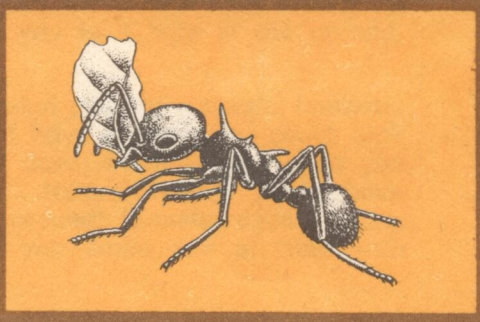

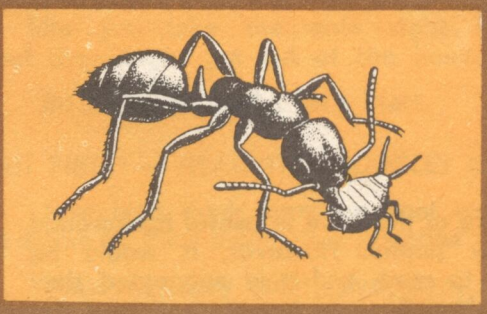

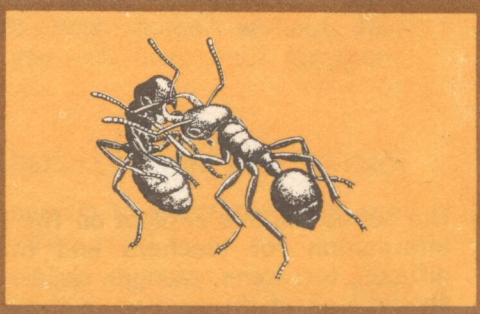

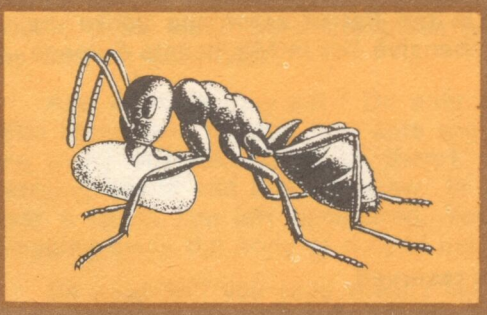

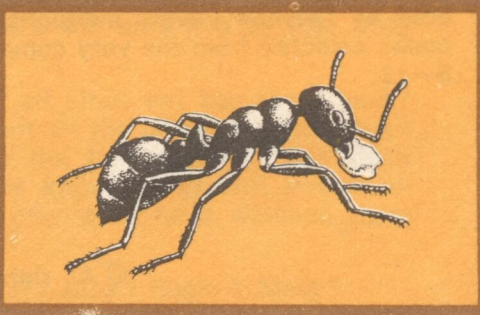

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The section in this booklet on The Life of the Ants is useful background information for teachers and older pupils. However, it would be difficult for some younger children to read, and it is suggested they should look at the section in the Oxford Book of Insects and read the book by Gwynne Vevers mentioned in the list of reference books, or books selected from the very comprehensive list in Minibeasts Science 5—13.

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ANT TOWN

You must have seen ants many times — in the garden at home, in the playground and even in the street. They move in a long, swarming file; and if you follow the file, it leads you to a hole in the ground, into which the ants disappear.

What goes on in this hole ? In your mind you see a magic, fantastic underground world ; and often you must have wished you could look through the hole and see what happens down there — but when you do look, you see nothing but darkness... Natural history books have much to tell about subterranean (underground) tunnels, caves, store-rooms and hatching chambers. If only you could see all this with your own eyes...!

The "Ant Town" set will show you the hidden world of the ants. It lets you take the ants right into your home, without fear that they might get out of the house you will have built for them.

So if you're ready, let's start.

BUT FIRST! — READ THIS BOOKLET CAREFULLY FROM END TO END!

Now let's think together what we can do to make the ants feel at home in their town What supplies do they need ?

Naturally, they must have earth to build their nest in. But what kind of earth ? Dry or moist ? Sand, shale, brown earth, black earth ? Should it be taken from the place where the ants live or just from the nearest sandheap ?

And what do they eat ? Do ants of all kinds eat the same food ? (You must have noticed that ants are not all the same, but that there are many different kinds of them). In the field you can see them carrying seeds and bits of straw. In the kitchen they will swarm all over a jar of jam left uncovered. You may even have watched them dragging away the body of a dead insect.

So what will you feed them ? Wheat ? Rice ? Sugar ? Meat ?

Then, what about light? Does light penetrate to their underground hideouts? Do they like to build their nests close to the surface where the sunlight can filter through, or do they prefer to live deep down in utter darkness?

All this you are going to find out for yourself — by experimenting. The experiments you are going to conduct will show whether your guesses were right or wrong.

True, some of the answers can be found in books about ants — but we think it would be much more interesting if you, instead of looking up the answers, discover them for yourself by collecting live ants and making experiments with them.

When and Where to find Ants and how to collect them

In the winter ants remain deep in the ground and well spread out and they are difficult to find because they do not move and they look exactly like the earth around them.

It is best to collect ants between May and September. Do not collect the large wood ants because they are too big for the ant town and also they squirt out formic acid quite a distance and would soon make the space inside the town unsuitable to live in.

The small yellow or black ants are suitable and common and so are the really tiny pharaoh ants which are found as pests in warehouses, hospitals and bakeries.

Take a plastic cup and a plastic spoon, a sheet of paper and a rubber band. Go down to the garden, or to the nearest field or public park, and look for a file of ants.

If you do not find any ants the first time, don't give up. You may have come at the wrong hour, when the weather is too hot or too cold, and the ants prefer to hide. Try again at another time — and when you have come across a file of ants, follow the file up to the nest. The entrance to the nest is a hole (or several holes) in the ground, usually in earth that has been dug up. Sometimes you are unlucky and the ants go underground long before they reach the nest.

When you have found the nest, dig down a little with the spoon and put the earth with the ants in it into the cup. Not too much. Just enough earth to be sure that you have at least a few dozen ants. About 30 to 50 small ants should feel fine in the new home they are going to move into. No less — because ants are social creatures who need plenty of company. But also no more than about 50! Until you have discovered what are the best living conditions for them, do not start experimenting with a very large number of ants. Close the cup with the sheet of paper and fasten with the rubber band.

No doubt you have read that ants have "queens", and that of all the ants in the nest only the queen lays eggs. The ordinary ants, called "workers", do not reproduce. Therefore, if you want to watch how ants develop from egg to adult, you must bring a queen to "Ant City".

Getting a queen is not easy, since queens live deep down, right at the bottom of the nest. To find one, you must take a spade and dig up the whole nest. Spread the earth on a large piece of white paper or cloth and look for a queen. There are only a very few of them in each nest, but they are easy to recognize because they are very big, many times the size of a worker ant. Also queens, except the young ones, have no wings. With a little patience, therefore, you will have no trouble finding a queen.

Now, to make Ant Town complete, we also need eggs and the two stages of development that follow the egg : larvae and pupae. While these are very small, there is a simple way of collecting them : when the worker ants are disturbed by your digging, they will try to escape ; and when ants escape, they try to take the young with them. Many of the ants you pick up will therefore be carrying eggs, larvae or pupae in their jaws.

The most interesting things happen in a nest that contains not only adults, but also young ants in all their various stages of development. You will have great fun watching how the worker ants care for them.

When you are first starting a colony of ants in your Ant Town do not be too ambitious. Learn their habits and diet and then, when you have observed them closely for some time, try to keep a colony going. Ants like many other animals tend to lay fewer eggs in crowded conditions and it is quite difficult to keep a balance.

ANT TOWN – INSTRUCTIONS FOR USE

The "Ant Town" set consists of the following parts :

1) 3 ants' houses of transparent material
2) 3 bases
3) 1 roof
4) 2 lids
5) 6 pedestals
6) 12 large plugs
7) 6 small plugs
8) 1 transparent plastic tube, perforated lengthwise
9) 1 funnel
10) 1 plastic pillar
11) 1 dropper
12) colored paper hoods

How to put up Ant Town

So far, all we have is a closed plastic cup containing earth with ants. Now we must build a house and put the ants inside it. To build the house, follow these instructions :

1) Each of the ants' houses consists of two halves. Take one pair of halves and fit them together. Make sure the fit is tight and there are no gaps.

After the house has been fitted together, stop up the round holes by means of the plugs. You need 4 large plugs and 2 small ones. Then take two pedestals and mount them on the **top edge** of the house. Insert the plastic pillar through the opening in the top edge, so that the pillar's thin end enters between the ends of the two staircases in the house. Now turn the house over, so that it stands on the two pedestals. The house now stands on its head (Fig. 1).

2) Take the funnel and fit it in its place on the bottom edge of the house, which now is the top edge (Fig. 2).

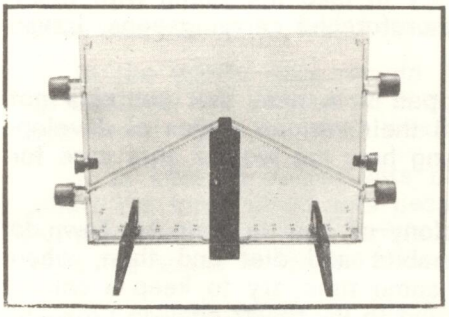


Fig. 1

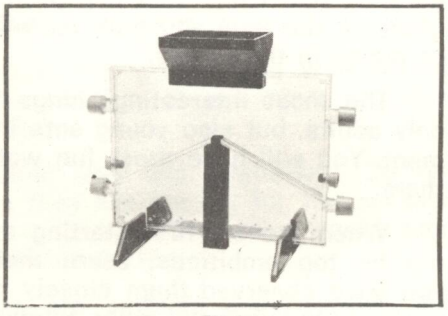


Fig. 2

3) Pour the whole contents of the plastic cup through the funnel into the house. Make sure the space above the staircases is **almost, but not completely** full of earth. About two thirds full is best. (Fig. 3).

4) Take off the funnel and quickly put on one of the bases. (Fig. 4).

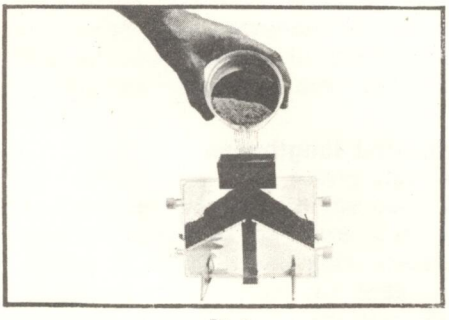


Fig. 3

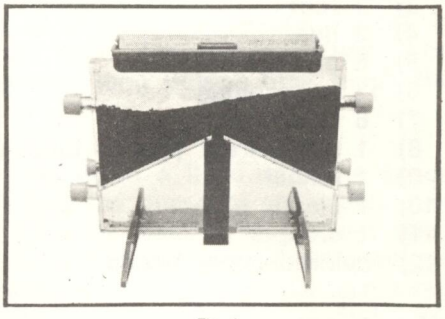


Fig. 4

5) Turn the house over again, so that it stands on the base (Fig. 5). Pull out the plastic pillar, take off the pedestals, and close the upper edge by putting on the roof or one of the two lids. (Figs. 6, 7).

Mount the pedestals on the house's bottom edge.

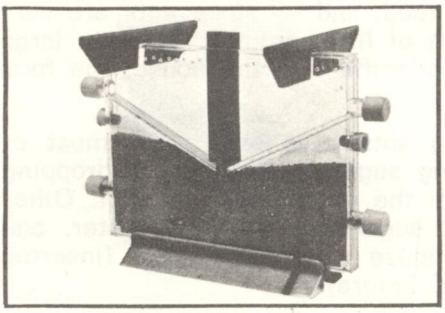


Fig. 6

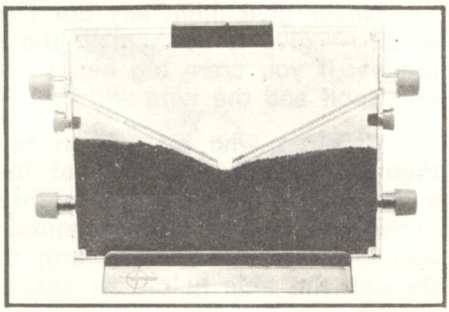


Fig. 5

How to feed and care for the Ants

The earth in the house should be moist (but not wet). To keep it moist, dissolve ¼ of a teaspoon of sugar in a little water and fill the dropper with the solution. Then take out one of the small plugs and carefully insert the dropper through the hole. Push the dropper in as far as it will go, then slowly pull it back and at the same time squirt drops of sugar water onto the earth. Make sure to moisten all the earth on this side of the house, **but do not flood** it. When the dropper is entirely pulled out, quickly replace the plug. Otherwise you will find the ants escaping all over the room.

Moisten the earth on the other side of the house in the same way (Fig. 8).

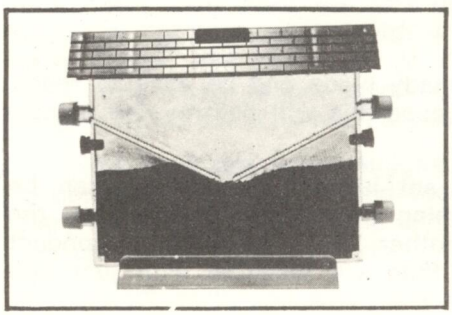


Fig. 7

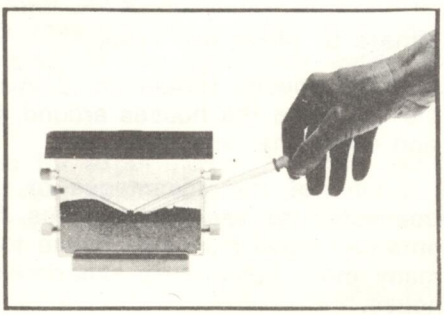


Fig. 8

The Ants' Food

Now you can start finding out what ants like to eat. Do they like sugar crystals, seeds of cereals (such as rice, wheat, barley, etc.), puffed wheat ? Or, maybe, meat ? Do ants eat meat ?

Whatever you feed them — remember that food spoils !

Never give them any but fresh food, and — since ants are very small — give it to them in the form of little crumbs, never in large pieces. If you cram big heaps of foodstuffs into the house, the food will spoil and the ants will die.

Children who have been raising ants have found that most of them like sugar. One way of feeding sugar to the ants is dropping a small cube into the house through the opening in the roof. Other children dissolved a teaspoonful of sugar in very little water, and sprinkled the sugar water into the house with the dropper (inserted through the side holes, as described before).

To make sure that the ants will not starve to death while you find out what kind of food they will eat, you might feed sugar to the ants in one house and give the ants in the other houses some other kind of food. Another way is to put several kinds of food into the same house and see what the ants prefer.

Whatever the food, it should always be put into the house through the opening in the roof and left lying on the stair-cases.

It is important that meat is not left around to go bad and it should be given in small pieces that can be removed if they are not eaten.

Cleaning Ant Town

Even with the best of care it sometimes happens that the ants do not get used to their new homes and die. If so, don't give up ! Take the house apart, throw away the earth, and rinse the parts of the house with clean water. Dry well, and start the experiment all over again.

Clean the houses in the same way each time you start a new experiment.

Where to place Ant Town

The houses should stand in a shady place and be easy to reach. Do not move the houses around, because this will destroy the tunnels and caves the ants have built.

One of the advantages of the set is that the houses can be connected to each other, thus forming a real Ant Town where the ants can crawl from one house to another. This allows you to conduct many more fascinating experiments than are possible with just one house.

How to connect the Houses

To connect the houses use the long plastic tube. As you will have seen, the houses have two projecting nozzles on either side. By removing the caps from these nozzles and fitting the tube ends over them, two houses can be connected to each other. (See examples in figs. 9 and 10).

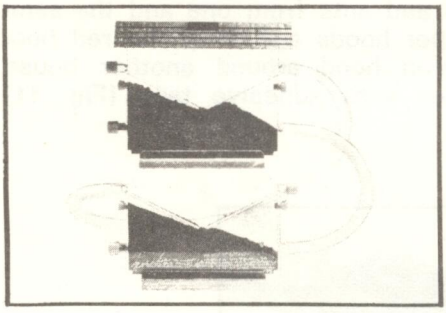


Fig. 9

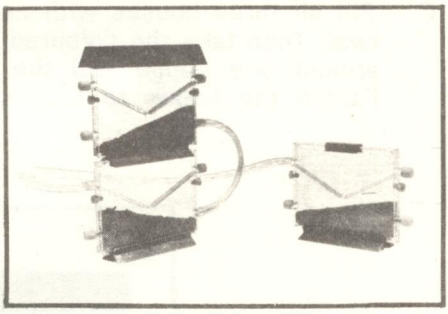


Fig. 10

To connect all three houses, cut off from the tube a piece 4—8 inches in length (or longer, if you like), so that you now have two connecting tubes. These two tubes can also be used for connecting two houses with a double connection. Naturally, houses should only be connected when they are filled with earth and ants.

It is best if for the first experiments at least, you put into the houses you have connected ants that come from the same nest and not from different nests.

SUGGESTIONS FOR EXPERIMENTS

Ants have a fascinating way of life, and watching them at their activities is always a source of fun and interest. To make it more interesting still, use a magnifying glass with which you can observe every smallest detail.

You will see that ants have on their heads somthing that looks like a huge pair of pincers. These are the jaws, the ants' main working tool. Apart from work, the ants use their jaws, which are very powerful, as a fighting weapon with which they bite the enemy. Ants also have stings, like bees, but in the ants of the temperate zones at least, this sting is not much developed. The ants' bite sometimes hurts a little, but it is not poisonous.

Now here are some suggestions for experiments you may want to conduct. Try them — and then invent some of your own. Keep a diary so that if you try some of the experiments again with other ants you can compare the results.

A. Collect earth and ants from a natural nest and put them into one of the houses. Then fill the other houses each with another kind of earth, and put in ants from the same nest. Now carefully observe the ants and see in which kind of earth they build the finest caves. (Do not forget to give the food and water).

B. Fill all three houses with earth and ants taken from one and the same nest, but put food in only one of the houses. This house will be the ants' restaurant. (Do not forget to connect the houses with the plastic tubes).

C. Fill all three houses with earth and ants from one and the same nest. Then take the coloured paper hoods and wrap the red hood around one house and the green hood around another house. Fasten the hoods to the houses with adhesive tape (Fig. 11).

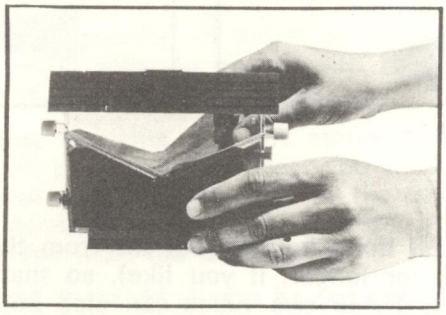


Fig. 11

The third house remains uncovered.

Now observe where the ants prefer to be.

After this, see what happens when you put a black hood on one of the houses.

Is it true that the ants feel better in a house with a hood on it? If so, what colour do they like best? Will they feel even better when the hoods are not of paper but of another material? Try it — and lift the hoods from time to time to see what goes on in the houses.

D. Fill one house with ants of one kind, and the second house with ants of another kind (or with ants of the same kind, but from another nest). Fill the third house only with earth. Now watch what happens. Will ants of different kinds or from different nests live in peace with each other, or will war break out?

E. Fill one or several houses half and half with two different layers of earth. The lower layer should be just sand; the upper layer nest earth with ants in it. To do this, turn the house over and fill in first the nest earth with the ants, then the sand. Take out the funnel, close with the base, and carefully turn the house over again.

What do you think the ants will do? Build their caves only in the nest earth or only in the sand? Or will they build caves in the sand and line them with nest earth?

We are sure that these experiments will have made you more and more curious about ants. This is why we are giving you on the following pages a short description of the ants' life and habits.

If you want to know more, you will find at the end of this booklet a list of books that will help you to study the subject more thoroughly.

THE LIFE OF THE ANTS

The world of the ants is something to marvel at. These creatures — some as tiny as 1/10 of a cm., others nearly 4 cm., live in a highly organized society. In their communal life there is order and discipline, and they work together to build and defend their nest.

The number of different species of ants is enormous. Some 15,000 species have so far been counted ; in Britain there are 41 species ; in Israel 140 species and subspecies. The ants of all species belong to the order of so-called hymenopterous insects, which is why they all have certain characteristics in common. Find out what other insects belong to this group.

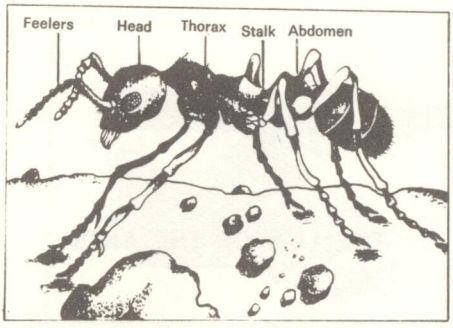
Ants are as different in behavior as they are in physical appearance. There are warrior ants who eat their prey, and farmer ants who grow their own food (mushrooms). Some ants are parasites who force other ants to feed them ; other ants are hunters and others again live on the hunters' booty. Certain ants attack the nests of termites (white ants), while other ants live with the termites in their nests and defend them against attackers.

Each of these many types of ants has developed physical characteristics that suit its habits : some ants, for instance, have heavy armour and therefore move slowly ; other ants, who have no fighting habits, have almost no armour and can move at great speed.

Like all insects, the ants have a body which consists of three main parts : the head, the thorax and the abdomen.

On its head the ant has a pair of feelers (called antennae) which are its principal sense organs. Next to these is a pair of large compound eyes, each of which is made up of a great many small sections or facets. Queens and males have, in addition, three small simple eyes, and their sight is somewhat better than that of the worker ants. The jaws, which project far out of the mouth, are the ant's main working tool.

As in other insects, there are three pairs of jointed legs connected to the ant's thorax. The legs are long in relation to the body and very strong. One characteristic that sets the ants apart from other hymenopterous insects is the narrow stalk that connects the thorax to the abdomen (Fig. 12).



The outer body shell of the ants (called exoskeleton) is made of a material called chitin. This is a hard material which resists chemicals and through which neither liquids nor gases can pass. It contains black, brown or red pigment, and therefore gives the ants their colour.

The Ants' Community Life

The ants' social life is marvellously organized. Every movement an ant makes is related to the community and part of the community's work. The division of work assigns a task to every single ant of the nest : there are queens who lay eggs, warriors who stand guard, and workers who do all the necessary chores. Close observation shows that the social and working order is strictly adhered to by all members of the community of ants.

Community life centers around the nest and its surroundings. The nest usually consists of a mass of underground tunnels and caves or chambers, although some ants — such as the builder ant — heap up mounds (anthills) above ground and build their tunnels and caves in them. Each nest has gates — and these are easily recognized by the crumbs of earth around them. This is the earth which the ants excavate when they build their chambers and passageways. Nests vary greatly in size : some are very big and have many gates ; others are much smaller. The depth of the nest depends on the kind of ant building it, on the nature of the ground, and on the number of caves or chambers needed. These chambers are used as living quarters, as "nurseries" (for eggs, larvae and pupae), and as storage rooms for food.

The division of tasks in the community of ants is simple but very well organized. It is based on the three types of ant that exist : the queens (the females), the males, and the workers who are sexless.

Each nest contains one or a few queens. They are much bigger than the other ants in the nest and have two pairs of membranous wings. Only the queens can lay eggs and produce offspring. When the mating season arrives, the young queens leave the nest and fly away, pursued by a swarm of males. These are smaller than the queens, but also have wings. This is the so-called nuptial flight — the only occasion when queens and males use their wings. While the queens hover in the air, they are fertilized by the males. Each queen mates with only one male, who then has completed his task in life and is no longer of any use to the community. He drops dead to the ground or is killed by the worker ants, having been alive for only a few weeks. The queen, after being fertilized, starts building a new nest.

Different kinds of ants choose different places for their nests, but mostly in the ground or in tree trunks. The fertilized queen makes her way into the ground or into a tree trunk, prepares a single chamber for herself and starts laying the first eggs.

What comes out of the egg is a kind of maggot called "larva". After a while, a stiff shell, called a "cocoon", forms around the larva. This cocoon with the larva inside it can neither move nor eat and is called a "pupa". During the pupal stage, the larva in the cocoon develops into an adult ant, which breaks out of the cocoon as soon as it is strong enough. This whole process of development from egg to adult, called "metamorphosis", lasts 3—4 weeks.

Almost all the eggs the queen lays during her lifetime are worker eggs. Only in her old age does she lay a few eggs from which queens and males develop. No nest ever contains more than a handful of males and a very small number of queens.

The first eggs laid in the new nest are cared for by the queen herself. Having no one to feed her, she lives during this time on what remains of her wings and on the fat stored in her abdomen. But when, after a few weeks, the first adult worker ants leave their cocoons, the queen is relieved of all work and henceforth does nothing but lay eggs. It is possible for a queen to live from 8 to 15 years. In her natural surroundings she normally lives 5—10 years.

The new-born worker ants, much smaller than the queen and without wings, do all the chores in the nest. They dig new tunnels and build new caves, they look after the pupae and feed the larvae, the queen, and also each other. They gather and store all the food, keep the nest clean, and defend it in case of danger. They form the vast majority of the nest's population — normally several thousand strong. Their life span is 3—4 years, but extra hard work or more than usually difficult living conditions can shorten their lives considerably.

There exists a division of work also among the workers themselves. Some specialize in gathering food, others in "nursing". During periods of drought ,these "nurses" often serve as living food stores for other workers, who, because they have other duties,

have not time to gather food themselves. This is possible because of an interesting detail of the worker ants' anatomy : they have two separate stomachs. One of these stomachs is for the food the ant itself consumes ; the other is the "communal" stomach, in which the ant stores food for other ants. When such an ant returns to the nest from a food-gathering expedition, it raises to its mouth droplets of digested food from its "communal" stomach and feeds them to its hugry fellow ants.

Some of the workers have a special task : attending the queen. They feed her and watch over the eggs she lays. They collect the eggs and carry them to special chambers where they can hatch in safety. These ants also care for the young "princesses", feeding and protecting them.

The behavior of the ants as an organized community is guided by deep-rooted instincts. All inhabitants of a nest recognize each other and stop or fight ants from foreign nests, even though these may be ants of their own kind. Whenever an unwanted guest arrives, he is attacked and driven out or killed by the nest's workers. Some kinds of ants, however, are more hospitable and receive house guests willingly. Usually such guests are small insects who live near the ants nest.

Ants of the same nest know each other by smell. Their sense of smell is very highly developed, much more than the human sense of smell, and they can distinguish between hundreds of different scents. Each ant has in its thorax a number of glands which secrete a smelly liquid through tiny tubes all over the ant's body. The smell of this liquid is common to the whole nest, and any ant that belongs to the nest can be recognized by it. Human noses generally cannot detect this smell, but for the ants it is an unfailing safety device.

For each kind of ant and each single nest has a smell of its own — and even in the same nest the smell changes from time to time. It happens sometimes that an ant who has been away from the nest a long time is not received back into it, because the nest smell has changed meanwhile.

Their keen sense of smell also helps the ants in finding their way outside the nest. Most ants leave traces of smell on the way. In this manner they mark out their foraging (food gathering) territory as well as the way back to the nest and to places, where they have found food. When two ants meet on the way, one will touch the other with its antennae (feelers). This is how the ant "tells" its fellow that it has found food somewhere and has left smell marks on the way to the place. The touch with the antennae gives the other ant a sample of that smell, so that it can go and bring back more food.

The Food Ants Eat

Ants eat almost anything — both plant and animal matter — although they have their preferences. The harvest ant, for instance, prefers grain seeds. Some ants attack other insects (sometimes even ants of another kind) and eat them.

There are ants who keep "milch cows". The "cows" are small insects called aphids, who suck the sap of plants and digest it into a sweet liquid. The ants catch these aphids, take them to their nest, and keep them there just like a human farmer keeps his cattle. When they want the aphids' "milk", they lick them, and the aphids then secrete from their bodies droplets of the sweet liquid the ants desire.

Another kind of ant that goes in for farming grows tiny mushrooms in its nests. They collect bits of leaves and other vegetable matter and chew them into a soft mass which they spread in their caves. This mass is a perfect growing bed for the ants' mushrooms.

In general, however, the ants' main food is plant seeds which they gather in the fields and carry to their nests. There they store the seeds in large storage chambers, making sure that they will not go hungry even in times of drought.

The Ants' Senses

The ants' life and behavior are determined to a large extent by their senses and sense organs.

In general, they have most of the senses human beings also have, though naturally the sense organs are different in structure and sensitivity.

Smell — This seems to be the ants' main sense. The smelling organs are located on the antennae and are very keen. We mentioned before that ants can distinguish between very many scents. When we observe an ant for some time, we find that it cleans its antennae very often. This is because every speck of dust on the antennae reduces the ant's ability to smell.

Touch — The sense of touch is highly developed. Tactile (touch) organs in the form of fine bristles are found all over the ant's body. Very thick tufts of bristles are found on the antennae and on the tips of the feet.

Hearing — Ants have no hearing as we know it, but it seems that they are able to detect certain vibrations by means of special organs found on various parts of their body. Scientists agree that these organs inform the ants about earth tremors, to which they are sensitive, and warn them when strangers approach the nest. (So far, scientists have not been able to prove this for all types of ants).

Some ants have an organ producing a chirping sound which other ants can hear, although it is inaudible to human ears.

Sight — Ants usually cannot see well. Like most insects they have two sets of eyes : a pair of compound eyes and three simple eyes, arranged in the form of a triangle on their foreheads (some ants do not have all these eyes). The purpose of these simple eyes is not entirely clear ; they seem to be used for close-range seeing. The compound eyes, on both sides of the head, are composed of many eye facets, the number of which varies with the kind of ant. There are ants whose eyes consist of only 30—40 facets. They can use these eyes only for general direction finding since they do not provide a clear picture of the surroundings. Other ants, however, have eyes composed of thousands of facets. These ants can see very well, and they also rely on their eyes rather than on their smell organs for finding their way. Ants can see colours and are even able to detect changes in the polarization of light (which humans cannot). This ability allows them to find their way from the nest and back, using the position of the sun as a reference.

Taste — The ants' sense of taste is at least as good as ours. They can clearly distinguish between sweet and sour. The taste organs are concentrated on the tongue. These organs allow many kinds of ants to choose certain foods and to reject others.

Temperature Sensitivity — Ants are highly sensitive to changes in temperature and can feel heat or cold from far away. They do not seem to have a specific sense organ for temperature perception, but they are often seen carrying their young to warm places or taking them away when it is too hot. The ants also feel the degree of humidity in the nest and regulate it to their liking.

When winter comes, the ants hide away in their underground nests where they do not feel the cold, and stay there until springtime. Some ants also hibernate (pass the winter in a state of torpor).

Sometimes, when danger threatens, the ants go out to look for another place to build a nest. Occasionally they will burrow their way underground from the old site to the new. In any case, they always take their young with them.

Those of the young who can move follow the adult ants, who show them the way ; those who cannot yet move are carried by the workers. Ants do not have to learn their complicated behaviour ; it is inherited and is known as instinct. Nevertheless, it seems that they also develop an individual memory. When an ant finds booty, it returns to the nest and reports about it to its fellows, using the sign language of its antennae. On occasion, an ant may even drag other ants bodily to the site of the find.

Metamorphosis

Just like other insects (such as bees, butterflies or beetles), the ants undergo a development cycle called metamorphosis. Eggs, as we know, are laid only by the queen. They are tiny eggs with a thin, transparent shell, and usually invisible to the naked eye. From the eggs issue small maggots without legs or head — the larvae.

An ant larva looks rather like a gourd: its front end is thin and violet-colored; the rest of the body is thick and straight. The larvae are fed and cared for by the worker ants. Sometimes the food in their abdomens can be seen as a brown spot. After a while, the larva transforms itself into a pupa. This pupa looks like a small, white, motionless ant — because the members of the future adult ant's body can be seen on it. The adult breaks out of the pupa when it is fully developed. Some kinds of ants have larvae that spin themselves a regular cocoon before going into the pupal stage.

The time taken for metamorphosis varies from kind to kind, and also depends on the season of the year. In summer, metamorphosis may be completed within 3—4 weeks.

Worker ants — the vast majority of the nest's population — are not necessarily all of the same size. An example for this is the harvest ant, which has larger and smaller workers. However, once an ant has reached full adulthood that is, when it comes out of the pupa, it grows no further.

Reference Books For Teachers.

Science 5—13 Minibeasts — MacDonald Educational

An extremely useful book with a very comprehensive book-list for the teacher and for the classroom.

Oxford Book of Insects by John Burton — Oxford University Press

Gives drawings and information about 14 of the British Species.

Ants and White Ants by Gwynne Vevers — Bodley Head

The Insects by Peter Farb — Life Nature Library

Chapter on The Ant Wisdom or Instinct.

Animal Communities by Michael Chinery — Collins International library

Chapter on Ants.

Insect Natural History by A.D. Imms. — Collins/Fontana

Nearly all these books have further references that could be followed up.

Important Notice

Make sure that all the perforations of the tube are open and allow passage of air. If some holes are wholly or partly closed, open or widen them with a nail or similar tool.